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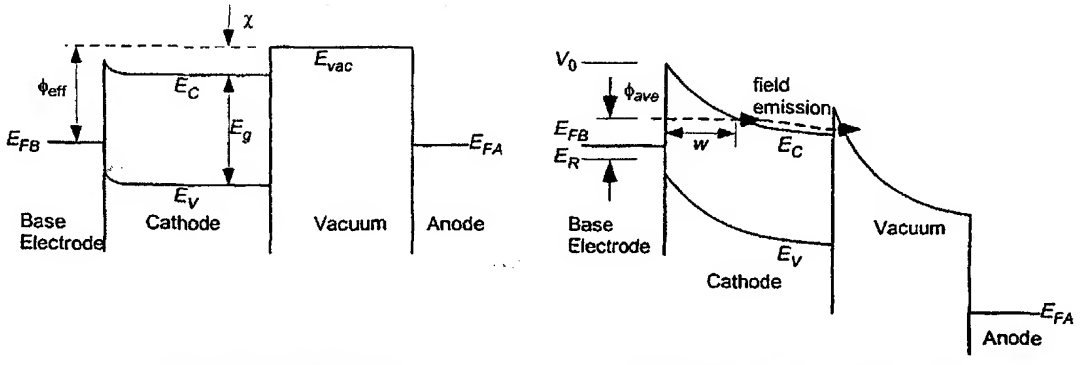
(54) Title: THERMODYNAMIC ENERGY CONVERSION DEVICES AND METHODS USING A DIAMOND-BASED ELECTRON EMITTER



(a) at thermal equilibrium

(b) tunneling into and from the conduction band under bias

Band diagrams for field emission from diamond cathodes. (a) Unbiased state. (b) Under bias with tunneling into and from diamond's conduction band.

(57) Abstract: An energy conversion device adapted to enhance field emission including a diamond emitter adapted to utilize band bending to emit a high-energy distribution of electrons to produce an enery conversion effect. The invention teaches the use of band bending to enable or enhance energy conversion. Three different band bending methods are described. The first involves the use of geometric tip enhancement. The second involves the inclusion of graphite-like (sp2-bonded) molecular structures within the polycrystalline film. These two features produce band bending via small geometric features, such as tips and filaments, as governed by electrostatic theory. The third involves the incorporation of p- and n-type dopants that produce band bending via space charge

WO 01/39235 A2